

Geroscience Redox Biology Core Services

Redox Status

Changes in redox status can have a major impact on cellular and physiologic processes and are believed to underlie many functional decrements associated with the aging process. Cellular energy production and survival depends upon a series of oxidation/reduction reactions. These reactions can give rise to free radical and pro-oxidant species that can act as regulatory molecules and induce oxidative damage. Thus, the redox potential of a cell reflects multiple interacting molecules and biological processes that influence both oxidant production and removal and ultimately cellular homeostasis.

Redox Status: Glutathione (GSH and GSSG) are measured by HPLC with electrochemical detection. NAD⁺, NADH, NADP⁺, NADPH are measured by LC/MS.

***TCA Intermediates:** TCA intermediates are highly sensitive to oxidative stress and redox changes because several key enzymes in the cycle are inactivated when oxidized. These disruptions lead to a measurable accumulation or depletion of specific TCA intermediates, which serves as a readout of the cell's metabolic response to oxidative challenge. TCA intermediates are measured by LC/MS and can be done on the same samples used for NAD(P)H measurements. Other metabolites can be assayed upon request.*

Oxidative Damage: Oxidative damage in lipids and proteins will be measured by the levels of F2-isoprostanes (lipid peroxidation) by GC/MS analysis and protein carbonylation, as detected after derivatization with a fluorophore.

ROS/RNS detection: ROS and RNS are measured in fresh cells and freshly isolated mitochondria by electron paramagnetic resonance (EPR) spin-trapping using a Bruker EMX Plus EPR.

Mitochondrial Function in Cells & Tissue

The Core provides investigators with services to measure mitochondrial function (oxidant generation and respiration) in fresh tissue samples or isolated mitochondria. This includes in vitro analyses of mitochondrial function in isolated mitochondria, respirometry analysis in fresh tissue using the Oroboros respirometer, as well as measurement of mitochondrial function in cells using the Seahorse XF24 Extracellular Flux Analyzer. In addition, we can assay electron transport chain activities (NADH oxidase and individual ETC activities) in frozen tissue samples.

Services

Service	Cost per Unit
nicotinamide adenine dinucleotides (NAD ⁺ , NADH, & NADP ⁺ , NADPH)	\$50/sample
TCA intermediates	\$50/sample
Both nicotinamide adenine dinucleotides and TCA	\$60/sample
Other metabolites	Consult for pricing
Reduced and oxidized glutathione (GSH and GSSG)	\$50/sample
F2-isoprostanes (lipid peroxidation)	\$100/sample
Protein oxidation (Fluorescent derivatization and SDS PAGE)	\$50/sample
Protein oxidation (Fluorescent derivatization and SDS 2D PAGE)	\$60/sample
Mitochondrial function	\$200/plate
Mitochondrial functional analysis on frozen tissue	\$25/sample
ROS/RNS	Consult for pricing